

FAX TRANSMISSION**DATE:** April 23, 2009**PTO IDENTIFIER:** **Application Number** 10/579,773-Conf. #5781**Patent Number****Inventor:** Kiyofumi Takano et al.**MESSAGE TO:** US Patent and Trademark Office, Examiner BERNSHTEYN, MICHAEL**FAX NUMBER:** (571) 273-2411**FROM:** EDWARDS ANGELL PALMER & DODGE LLP

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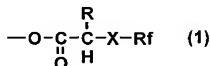
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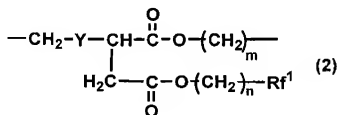
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10/579,773
April 23, 2009**DRAFT LISTING OF CLAIMS**

Claim 1 (Currently Amended): A fluorine-containing photocurable composition containing a (meth)acrylate having a fluorinated alkyl group (A) and a photopolymerization initiator (B); wherein the (meth)acrylate (A) includes a functional group (A-i) represented by general formula (1) in which a fluorinated alkyl group is included at the terminal end thereof, and two or more (meth)acryloyl groups (A-ii), and the fluorine atom content in one molecule of the (meth)acrylate (A) is 25% by weight or more, and molecular weight of the (meth)acrylate (A) is 500 to 4000,



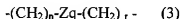
(~~in the general formula (1),~~ wherein R represents a hydrogen atom or alkyl group having 1 to 4 carbon atoms; X represents an alkylene chain, which may have a hetero atom, or a connecting group represented by the following general formula (2); and Rf represents a fluorinated alkyl group)



(~~in the formula (2),~~ wherein Y represents an oxygen atom or a sulfur atom; m and n are an integer of 1 to 4 which may be the same or different from each other; and Rf¹ is a fluorinated alkyl group).

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Claim 2 (Currently Amended): The fluorine-containing photocurable composition according to claim 1, wherein X in the general formula (1) is an alkylene chain represented by the following general formula (3),



(in the general formula (3), wherein Z represents -NR-SO₂- (R represents a hydrogen atom or alkyl group having 1 to 24 carbon atoms) or a sulfur atom, an oxygen atom, or nitrogen atom which has a hydrogen atom or alkyl group having 1 to 24 carbons; p represents an integer of 0 to 4; q represents 0 or 1; r represents an integer of 0 to 20; and $1 \leq p+r \leq 20$).

Claim 3 (Currently Amended): The fluorine-containing photocurable composition according to claim 1, wherein X in the general formula (1) is an alkylene chain represented by the general formula (3) (wherein Z represents -NR-SO₂- (R represents a hydrogen atom or alkyl group having 1 to 24 carbon atoms) or a sulfur atom, an oxygen atom, or a nitrogen atom which has a hydrogen atom or alkyl group having 1 to 24 carbons; p represents 1; q represents 1; and r represents an integer of 0 to 19); or a connecting group represented by the general formula (2) (wherein R^f represents -C_nF_{2n+1} (n represents an integer of 1 to 20); and R_f in the general formula (1) represents -C_nF_{2n+1} (n represents an integer of 1 to 20) which may be the same as or different from the R^f).

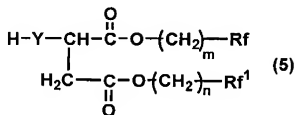
Claim 4 (Currently Amended): The fluorine-containing photocurable composition according to claim 3, wherein X in the general formula (1) is an alkylene chain represented by the general formula (3) (Z represents -NR-SO₂- (R represents an alkyl group having 1 to 6 carbon atoms), a sulfur atom or a nitrogen atom or a connecting group represented by the general formula (2) (Y represents a sulfur atom, and the carbon number n of R^f is 4, 6 or 8); and the carbon number n of R_f in the general formula (1) is 4, 6 or 8).

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Claim 5 (Currently Amended): The fluorine-containing photocurable composition according to claim 1, wherein the (meth)acrylate having a fluorinated alkyl group (A) is a compound which is obtained by reacting a compound (a1) containing three or more (meth)acryloyl groups with a compound represented by the general formula (4), or by reacting a compound (a1) containing three or more (meth)acryloyl groups with a compound (a2) represented by the general formula (5) such that the compound (a2) is used in an amount of 0.01 to (k-2) mole (wherein k represents the average number of (meth)acryloyl groups included in one molecule of the compound (a)) with respect to 1 mole of the compound (a1),



~~(in the general formula (4), wherein~~ r represents an integer of 0 to 20; Rf represents $-\text{C}_n\text{F}_{2n+}$ (n represents an integer of 1 to 20); and Z represents $-\text{SO}_2-\text{NR}-$ (R represents a hydrogen atom or an alkyl group having 1 to 24 carbon atoms) or a sulfur atom, oxygen atom, or nitrogen atom which has a hydrogen atom or alkyl group having 1 to 24 carbon atoms)

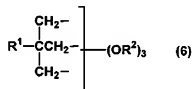


~~(in the general formula (5), wherein~~ Y represents an oxygen atom or a sulfur atom; m and n are an integer of 1 to 4 which may be differ from or the same as each other; and Rf and Rf¹ represent $-\text{C}_n\text{F}_{2n+1}$ (n represents an integer of 1 to 20[.])) which may be different from or the same as each other).

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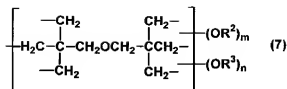
Claim 6 (Original): The fluorine-containing photocurable composition according to claim 5, wherein the compound (a2) is a compound represented by the general formula (4) (Z represents -SO₂-NR- (R represents an alkyl group having 1 to 6 carbon atoms) or a sulfur atom, or nitrogen atom which has a hydrogen atom or alkyl group having 1 to 6 carbon atoms and carbon number n in Rf is 4, 6, or 8), or a compound represented by the general formula (5) (Y represents a sulfur atom, and the carbon number n in Rf and Rfl is 4, 6, or 8).

Claim 7 (Currently Amended): The fluorine-containing photocurable composition according to claim 5 or 6, wherein the compound (a1) containing three or more (meth)acryloyl groups is at least one selected from the group consisting of: a compound (a1-1) represented by the general formula (6), a compound (a1-2) represented by the general formula (7), a urethane (meth)acrylate (a1-3), a cyanurate ring-containing tri(meth)acrylate (a1-4), and a phosphoric acid tri(meth)acrylate (a1-5),



(in the general formula (6); wherein R¹ represents a hydroxyl group, an alkyl group having 1 to 24 carbon atoms, an alkyl carbonyloxy group having 1 to 24 carbon atoms, CH₂=CHCO₂CH₂-, CH₂=C(CH₃)CO₂CH₂-, a (poly)oxyalkylene group, wherein the number of repeating units is one or more and terminal end thereof is blocked with a hydrogen atom or alkyl group having 1 to 18 carbon atoms, or an alkylol group having 1 to 12 carbon atoms; and R² represents an (meth)acryloyl group)

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(in the general formula, wherein R^2 represents a (meth)acryloyl group; R^3 represents a hydrogen atom or alkyl carbonyl group having 1 to 18 carbon atoms; m represents an integer of 3 to 6 n represents an integer of 0 to 3; and $m + n = 6$).

Claim 8 (Original): The fluorine-containing photocurable composition according to claim 7, wherein the compound (a1) containing three or more (meth)acryloyl groups is a compound represented by the general formula (6) (wherein, R^1 represents a straight chain alkyl group having 1 to 4 carbon atoms, $\text{CH}_2=\text{CHCO}_2\text{CH}_2\text{---}$, $\text{CH}_2=\text{C}(\text{CH}_3)\text{CO}_2\text{CH}_2\text{---}$, or alkylol group having 1 to 3 carbon atoms), a compound represented by the general formula (7) (wherein, R^3 represents a hydrogen atom or alkyl carbonyl group having 1 to 12 carbon atoms), or urethane (meth)acrylate which can be obtained by reacting a hydroxyl group-containing (meth)acrylate (x1) which has two or more (meth)acryloyl groups and an isocyanate compound (x2) which has an alicyclic structure.

CLAIM SUPPORT

Examples, which correspond to compounds represented by the general formulas (6) and (7) of Claim 7, are shown on pages 15 to 19 of the present specification.

As shown in lines 8 to 10 on page 14 of the present specification, there is a recitation that:

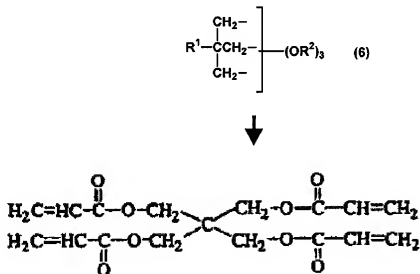
Here, the following examples are examples for acrylate, and each acryloyl group in the following examples may be replaced with a methacryloyl group.

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Accordingly, an acryloyl group of the compounds on pages 15 to 19 of the present specification may be changed to a methacryloyl group. Furthermore, please refer to Synthetic Examples 3 and 5 of the present specification. Trimethylol propane trimethacrylate, which is a compound having a methacryloyl group, is used.

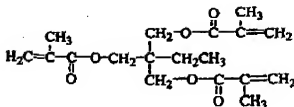
In addition, concrete examples of the compound (a1-1) represented by the general formula (5) and the compound (a1-2) represented by the general formula (7) are shown below. The compounds show that Claims 7 and 8 are supported concretely by the present specification.

[Concrete examples of the compound (a1-1) represented by the general formula (6)]



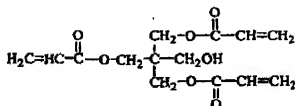
(i) Pentaerythritol tetraacrylate

(Synthetic Examples 2 and 7, and the description on page 23 of the present specification)

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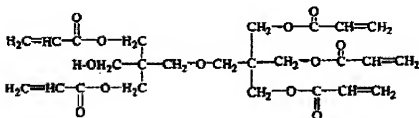
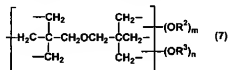
(ii) Trimethylol propane trimethacrylate

(Synthetic Examples 3 and 5 of the present specification)



(iii) Pentaerythritol triacrylate

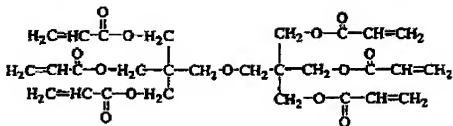
(Synthetic Example 4 and description on page 22 of the present specification)

[Concrete examples of the compound (a1-2) represented by the general formula (7)]

(i) Dipentaerythritol hydroxypentaacrylate

(Synthetic Examples 10 and 11 and description on page 23 of the present specification)

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(ii) Dipentaerythritol hexaacrylate

(Synthetic Example 12 and description on page 23 of the present specification)